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**NATIONAL
SENIOR CERTIFICATE /
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2025

**TECHNICAL MATHEMATICS P1 /TEGNIJSE WISKUNDE V1
MARKING GUIDELINE/NASIENRIGLYN**

MARKS / PUNTE: 150

MARKING CODES/NASIENKODES	
A	Accuracy/Akkuraatheid
CA	Consistent accuracy/Volgehoue akkuraatheid
M	Method/Metode
R	Rounding/Afronding
NPR	No penalty for rounding/Geen penalisering vir afronding nie
NPU	No penalty for units omitted/Geen penalisering vir eenhede weggelaat nie
S	Simplification/Vereenvoudiging
SF	Substitution in correct formula/Vervanging in korrekte formule

This marking guideline consists of 14 pages/
Hierdie nasienriglyn bestaan uit 14 bladsye.



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QUESTION/VRAAG 1

1.1.1	$2x(1-x) = 0$ $x = 0$ or/of $x = 1$	$\checkmark x = 0$ $\checkmark x = 1$	A A (2)
1.1.2	$x - 6 = -3x^2$ $3x^2 + x - 6 = 0$ $x = \frac{-1 \pm \sqrt{(1)^2 - 4(3)(-6)}}{2 \times 3}$ $x = 1,26$ or/of $x = -1,59$	$\checkmark$ standard form/standaardvorm $\checkmark$ SF $\checkmark$ $\checkmark x = -1,59$	A CA CA CA (4)
1.1.3	$x^2 - 6x - 16 \leq 0 \quad (x \in N, x \geq 4)$ CVs / KWs $(x - 8)(x + 2) = 0$ OR/OF $x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-16)}}{2(1)}$ $x = 8$ or/of $x = -2$ $-2 \leq x \leq 8$ $x \in \{4; 5; 6; 7; 8\}$	$\checkmark$ factors/substitution/faktore / vervanging $\checkmark$ critical values /kritiese waardes $\checkmark$ notation/notasie $\checkmark x \in \{4; 5; 6; 7; 8\}$	A CA A CA (4)
1.2	$x = 1 - y$ en $x^2 + y^2 = 25$ $(1 - y)^2 + y^2 = 25$ $1 - 2y + y^2 + y^2 = 25$ $2y^2 - 2y - 24 = 0$ $y^2 - y - 12 = 0$ $(y - 4)(y + 3) = 0$ $y = 4$ or/of $y = -3$ $x = 1 - 4$ or/of $x = 1 - (-3)$ $x = -3$ or/of $x = 4$ OR/ OF	$\checkmark$ substitution/vervanging $\checkmark$ standard form/standaardvorm $\checkmark$ factors/faktore $\checkmark$ both y-values/beide y-waardes $\checkmark$ both x-values/beide x-waardes OR/ OF	CA CA CA CA CA



	$y = 1 - x$ $x^2 + (1 - x)^2 = 25$ $x^2 + 1 - 2x + x^2 - 25 = 0$ $2x^2 - 2x - 24 = 0$ $x^2 - x - 12 = 0$ $(x + 3)(x - 4) = 0$ $x = -3$ or/of $x = 4$ $y = 1 - (-3)$ or/of $y = 1 - 4$ $y = 4$ or/of $y = -3$	✓ substitution/vervangings ✓ standard form/standaardvorm ✓ factors/faktore ✓ both x-values/beide x-waardes ✓ both y-values/beide y-waardes (5)	CA CA CA CA (5)
1.3.1	$I = \frac{b \cdot h^3}{12}$ $12I = bh^3$ $b = \frac{12I}{h^3}$	✓ 12I subject/onderwerp ✓ $b = \frac{12I}{h^3}$ (2)	A CA (2)
1.3.2	$b = \frac{12 \times 12\,000\,m^4}{(100\,mm)^3}$ $b = 0,144\,mm$ OR/OF $12\,000 = \frac{b(100)^3}{12}$ $b = \frac{144\,000}{(100)^3}$ $b = 0,144\,mm$	✓ substitution/vervangings ✓ $b = 0,144\,mm$ OR/OF ✓ substitution/vervangings ✓ Value of b/waarde van b NPU (2)	CA CA A CA (2)
1.3.3	$1,44 \times 10^{-1}$	✓ $1,44 \times 10^{-1}$	CA (1)
1.4.1	$1111011_2 = 2^0 + 2^1 + 2^3 + 2^4 + 2^5 + 2^6$ $= 123$ $123 \div 3 = 41$	✓ 123 ✓ 41 (2)	A CA (2)
1.4.2	$41 = 101001_2$	✓ 101001_2	CA (1)
		[23]	



QUESTION/VRAAG 2

2.1	$\Delta < 0$ $12 - 3q < 0$ $q > 4$	$\checkmark \Delta < 0$ $\checkmark q > 4$	A CA (2)
2.2.1	$\Delta = 0$	$\checkmark \Delta = 0$	A (1)
2.2.2	$(p-3)^2 - 4(1)(4) = 0$ $p^2 - 6p - 7 = 0$ $(p-7)(p+1) = 0$ $p = 7$ or/of $p = -1$	$\checkmark$ substitution/ <i>vervanging</i> $\checkmark$ factors/ <i>faktore</i> $\checkmark$ values of/ <i>waardes van p</i>	A CA CA (3)
			[6]





QUESTION/VRAAG 3			
3.1.1	$\frac{(2a^0)^{-1}}{4}$ $= \frac{1}{8}$	$\checkmark \frac{1}{8}$	A (1)
3.1.2	$\frac{3 \cdot 2^{x+1} + 2 \cdot 2^{2x}}{2^{2x} + 3 \cdot 2^x}$ $= \frac{3 \cdot 2^x \cdot 2 + 2 \cdot 2^x \cdot 2^x}{2^x \cdot 2^x + 3 \cdot 2^x}$ $= \frac{2 \cdot 2^x (3 + 2^x)}{2^x (2^x + 3)}$ $= 2$	$\checkmark$ exponential property/ <i>eksponensiële eienskap</i> $\checkmark$ common factor / <i>gemene faktor</i> $\checkmark$ answer/ <i>antwoord</i>	A CA CA (3)
3.1.3	$\frac{\sqrt{243} - 2\sqrt{12}}{\frac{\sqrt{75}}{\sqrt{81 \times 3} - 2\sqrt{4 \times 3}}}$ OR/OF $\frac{\sqrt{3^4 \times 3} - 2\sqrt{2^2 \times 3}}{\sqrt{3 \times 5^2}}$ $= \frac{9\sqrt{3} - 4\sqrt{3}}{5\sqrt{3}}$ $= \frac{5\sqrt{3}}{5\sqrt{3}}$ $= 1$	$\checkmark$ prime factors/ <i>priemfaktore</i> $\checkmark$ simplification / <i>vereenvoudig</i> $\checkmark$ answer / <i>antwoord</i>	A CA CA (3)
3.2.1	$x \log_3 2 - \log 100 = x \log_3 6$ $x \log_3 2 - x \log_3 6 = 2$ $\therefore x \log_3 \frac{2}{6} = 2$ $x \log_3 \frac{1}{3} = 2$	$\checkmark \log 100 = 2$ $\checkmark x \log_3 \frac{2}{6}$	A A (2)



3.2.2	$x \log_3 \frac{1}{3} = 2$ $\therefore x \log_3 3^{-1} = 2$ $\therefore -x \log_3 3 = 2$ $\therefore -x(1) = 2$ $\therefore x = -2$	$\checkmark \log_3 3^{-1}$ CA $\checkmark$ power law/mag wet CA $\checkmark x = -2$ CA (3)
3.3.1	$z = -3 - i$	$\checkmark -3$ A $\checkmark -i$ A (2)
3.3.2	$ r = \sqrt{(-3)^2 + (-1)^2}$ $ r = \sqrt{10}$	$\checkmark$ SF CA $\checkmark$ modulus CA (2)
3.3.3	$\theta_{ref} = \tan^{-1} \left(\frac{1}{3} \right)$ $\theta_{ref} \approx 18,43^\circ$ $\theta = 180^\circ + 18,43^\circ$ $\theta = 198,43^\circ$ OR/OF $\theta = 180^\circ + \tan^{-1} \left(\frac{1}{3} \right)$ $\theta = 198,43^\circ$	$\checkmark$ reference angle/ verwysingshoek A $\checkmark$ correct quadrant/ korrekte kwadrant A $\checkmark \theta = 198,43^\circ$ CA OR/OF $\checkmark \tan^{-1} \left(\frac{1}{3} \right)$ A $\checkmark$ correct quadrant A $\checkmark \theta = 198,43^\circ$ CA (3)
3.3.4	$z = \sqrt{10} \text{cis} 198,43^\circ$ or/of $z = \sqrt{10}(\cos 198,43^\circ + i \sin 198,43^\circ)$	$\checkmark$ answer/antwoord CA (1)





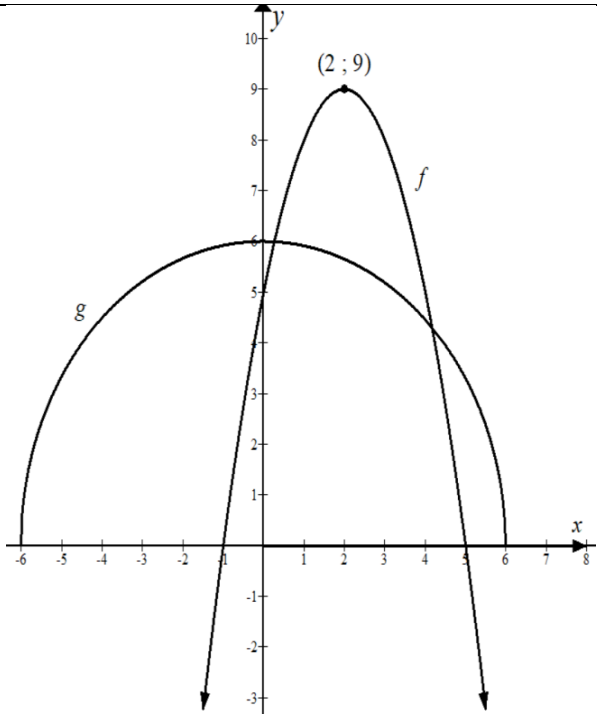
3.4	Solve for x and y if $x - 4yi = \frac{3}{i}$ $x - 4yi = \frac{3}{i} \times \frac{-i}{-i}$$x - 4yi = \frac{-3i}{-i^2}$$x - 4yi = \frac{-3i}{-(-1)}$$x - 4yi = -3i$$x = 0 \text{ or/of } -4yi = -3i$$y = \frac{3}{4}$ OR/OF $xi - 4yi^2 = 3$$xi - 4y(-1) = 3$$xi + 4y = 3$$x = 0 \text{ or/of } y = \frac{3}{4}$ <td> ✓ method/metode A ✓ -1 A ✓ $x = 0$ CA ✓ $y = \frac{3}{4}$ CA OR/OF ✓ method/metode A ✓ -1 A ✓ $x = 0$ CA ✓ $y = \frac{3}{4}$ CA (4) </td>	✓ method/metode A ✓ -1 A ✓ $x = 0$ CA ✓ $y = \frac{3}{4}$ CA OR/OF ✓ method/metode A ✓ -1 A ✓ $x = 0$ CA ✓ $y = \frac{3}{4}$ CA (4)
	[24]	



QUESTION/VRAAG 4

4.1.1	$B(-2;0)$ $y = 3^{-0} + 1$ $y = 2$ $C(0;2)$	$\checkmark B(-2; 0)$ $\checkmark x_c = 0$ $\checkmark y_c = 2$	A A CA
			(3)
4.1.2	$m = \frac{0-2}{-2-0}$ $m = 1$ $y = x + 2$ OR/OF $y - 2 = (x - 0)$ $y = x + 2$	$\checkmark$ substitution/vervanging $\checkmark m = 1$ $\checkmark y = x + 2$	A CA CA
			(3)
4.1.3	$y = 1$	$\checkmark y = 1$	A
			(1)
4.1.4	$y = 3^{-(-2)} + 1$ $y = 10$ $AB = 10 - 0$ $AB = 10$ OR/OF $A(-2; 10)$ $AB = \sqrt{(-2 - (-2))^2 + (10 - 0)^2}$ $AB = 10$ units/eenhede	$\checkmark$ substitution/vervanging $\checkmark y$ value/waarde $\checkmark AB = 10$ units /eenhede OR/OF $\checkmark A(-2; 10)$ $\checkmark$ substitution/vervanging $\checkmark AB = 10$ units/eenhede	A CA CA
			(3)
4.1.5	$p(x) = 3^{-(-x)} + 1$ $= 3^x + 1$	$\checkmark p(x) = 3^x + 1$	A
			(1)
4.2.1	T.P (2 ; 9)	$\checkmark\checkmark (2 ; 9)$	A
			(2)
4.2.2	$f(x) = -(x-2)^2 + 9$ $= -(x^2 - 4x + 4) + 9$ $f(x) = -x^2 + 4x + 5$	$\checkmark f(x) = -x^2 + 4x + 5$	A CA
			(1)
4.2.3	$y = 5$ $x^2 - 4x - 5 = 0$ $(x-5)(x+1) = 0$ $x = 5$ or/of $x = -1$	$\checkmark y = 5$ $\checkmark$ factors/faktore $\checkmark$ both values/beide waardes	A CA CA
			(3)



4.2.4	$0 \leq y \leq 6$	✓ critical values/kritiese waardes ✓ notation/notasie	A A (2)
4.2.5		<i>f</i> : ✓ shape/vorm ✓ all intercepts/alle afsnitte ✓ turning point/draaipunt	A CA CA
4.2.6	$-6 \leq x \leq -1$ or/of $5 \leq x \leq 6$	✓ notation/notasie ✓ critical values/kritiese waardes ✓ notation/notasie ✓ critical values/kritiese waardes	A CA A CA (5) (4)



4.3.1	$p = 4$ $q = 2$	$\checkmark p = 4$ $\checkmark q = 2$	A A (2)
4.3.2	$y = \frac{a}{x-4} + 2$ $3 = \frac{a}{5-4} + 2$ $a = 1$ $y = \frac{1}{x-4} + 2$	$\checkmark$ substitute/vervang (5 ; 3) $\checkmark a = 1$ $\checkmark y = \frac{1}{x-4} + 2$	A CA CA (3)
			[33]



QUESTION/VRAAG 5

5.1	$i_{eff} = \left(1 + \frac{i_{nom}}{m}\right)^m - 1$ $i_{eff} = \left(1 + \frac{0,03}{4}\right)^4 - 1$ $i_{eff} = 3,03\%$	✓ substitution/vervanging ✓ $i_{eff} = 3,03\%$	A CA CA (3)
5.2.1	6,7 % of/van R1 500 = R100,50	✓ R100,50	A (1)
5.2.2	Loan amount/leningsbedrag = R1 500 – R100,50 = R1 399,50	✓ method/metode ✓ R1 399,50	A CA (2)
5.2.3	$A = P(1 + in)$ $= R1399,5(1 + 0,15 \times 0,5)$ $A = R1\ 504,4625$ Actual amount paid/Werklike bedrag betaal $= R1\ 504,4625 + R100,50$ $= R1\ 604,96$	✓ substitution/vervanging ✓ $A = R1\ 504,46$ ✓ R1 604,96	A CA CA CA (3)
5.2.4	monthly repayments/maandelikse betalings $= \frac{1504,46}{6} = R250,74$	✓ method/metode ✓ R250,74	CA (2)
5.3	$A = R8000 \left(1 + \frac{0,06}{4}\right)^{4 \times 1,5} \left(1 + \frac{0,075}{12}\right)^{12 \times 3,5}$ $A = R11\ 364,07$ OR / OF $A_1 = R8000 \left(1 + \frac{0,06}{4}\right)^{4 \times 1,5}$ $A_1 = R8\ 747,546112$ $A = R8\ 747,546112 \left(1 + \frac{0,075}{12}\right)^{12 \times 3,5}$ $A = R11\ 364,07$	✓ $\frac{0,06}{4}$ ✓ $1,5 \times 4 = 6$ ✓ $\frac{0,075}{12}$ ✓ $12 \times 3,5 = 42$ ✓ $A = R11\ 364,07$ OR / OF ✓ $4 \times 1,5$ ✓ R8 747,54 6112 ✓ $\frac{0,075}{12}$ ✓ $12 \times 3,5$ ✓ R11 364, 07	A A A A CA A CA A A CA (5)
			[16]



QUESTION/VRAAG 6

6.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{3 - (x+h) - (3-x)}{h}$ $= \lim_{h \rightarrow 0} \frac{3 - x - h - 3 + x}{h}$ $= \lim_{h \rightarrow 0} \frac{-h}{h}$ $= \lim_{h \rightarrow 0} -1$ $f'(x) = -1$	✓ definition/definisie ✓ substitution/vervanging ✓ simplification/vereenvoudiging ✓ simplification/vereenvoudiging ✓ answer/antwoord	A A CA CA CA
6.2.1	$x = 2y + 1$ $y = \frac{x}{2} - \frac{1}{2}$ $\frac{dy}{dx} = \frac{1}{2}$	✓ y-subject/onderwerp ✓ $\frac{1}{2}$	A CA (2)
6.2.2	$D_x \left[x \left(x^{\frac{1}{3}} + \frac{1}{x^2} - \frac{2}{x} \right) \right]$ $= D_x \left[x^{\frac{4}{3}} + \frac{1}{x} - 2 \right]$ $= D_x \left[x^{\frac{4}{3}} + x^{-1} - 2 \right]$ $= \frac{4}{3} x^{\frac{1}{3}} - x^{-2}$	✓ $x^{\frac{4}{3}}$ ✓ $\frac{1}{x}$ ✓ -2 ✓ x^{-1} ✓ $\frac{4}{3} x^{\frac{1}{3}}$ ✓ $-x^{-2}$	A A A CA CA CA (6)
6.3	$g(-3) = 2(-3)^2 = 18$ $y - 18 = -12(x + 3)$ $y = -12x - 18$	✓ $g(-3) = 2(-3)^2 = 18$ ✓ substitution /vervanging ✓ $y = -12x - 18$	A A CA (3)
			[16]





QUESTION/VRAAG 7

7.1	$f(x) = (x-2)(x-2)(x+3)$ $f(x) = (x-2)(x^2 + x - 6)$	$\checkmark (x-2)(x+3)$ $\checkmark x^2 + x - 6$	A A (2)
7.2	$f(x) = x^3 - x^2 - 8x + 12$ $f'(x) = 3x^2 - 2x - 8$ $3x^2 - 2x - 8 = 0$ $(3x+4)(x-2) = 0$ OR/OR $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-8)}}{2(3)}$ $x = -\frac{4}{3}$ or/of $x = 2$ $f\left(-\frac{4}{3}\right) = \frac{500}{27} \approx 18,52$ $f(2) = 0$ $\left(-\frac{4}{3}; \frac{500}{27}\right)$ and/en $(2; 0)$	$\checkmark$ standard form/ <i>standaardvorm</i> $\checkmark$ derivative/afgeleide f $\checkmark$ derivative/afgeleide $f = 0$ $\checkmark$ factors/faktore $\checkmark$ both x -values at the turning points/ <i>beide x-waardes van die draaipunte</i> $\checkmark$ both y -values of the turning point/ <i>beide y-waardes van die draaipunt</i>	A CA A CA CA CA (6)
7.3	$(0; 12)$	$\checkmark 0$ $\checkmark 12$	A CA (2)
7.4		$\checkmark$ shape/vorm $\checkmark$ x -intercepts/afsnitte $\checkmark$ y -intercept/afsnit $\checkmark$ turning points/draaipunte	A CA CA CA (4)
7.5	$-\frac{4}{3} < x < 2$	$\checkmark$ critical values/kritiese waardes $\checkmark$ notation/notasie	A A (2)
		[16]	



QUESTION/VRAAG 8

8.1	$v(0) = 9 \text{ m/s}$	✓ 9 m/s	A (1)
8.2	$v(t) = 3t^2 - 12t + 9$ $v'(t) = 6t - 12$ $6t - 12 = 0$ $t = 2 \text{ sec/sek}$ $v(2) = 3(2)^2 - 12(2) + 9$ $v(2) = -3 \text{ m/s}$	✓ $v'(t) = 6t - 12$ ✓ $6t - 12 = 0$ ✓ $t = 2 \text{ seconds/sekondes}$ ✓ $v(2) = 3(2)^2 - 12(2) + 9$ ✓ $v = -3 \text{ m/s}$	A A CA CA (5)
			[6]

QUESTION/VRAAG 9

9.1.1	$\int (-4x + \pi) dx$ $= -2x^2 + \pi x + c$	✓ $-2x^2$ ✓ πx ✓ c	A A A (3)
9.1.2	$\int 3^{-2x} - 7x^{-1} dx$ $= \frac{3^{-2x}}{-2 \ln 3} - 7 \ln x + c$	✓ $\frac{3^{-2x}}{-2 \ln 3}$ ✓ $-7 \ln x + c$	A A (2)
9.2	$A = \int_1^3 (-x^3 + 2x) dx$ $= \left[-\frac{x^4}{4} + x^2 \right]_1^3$ $= \left[-\frac{(3)^4}{4} + (3)^2 \right] - \left[-\frac{(1)^4}{4} + (1)^2 \right]$ $= 12 \text{ square units/vierkanteeenhede}$	✓ area notation/notasie ✓ $-\frac{x^4}{4} + x^2$ ✓✓ substitution/vervangings ✓ $A = 12$	A A A CA (5)
			[10]
TOTAL/TOTAAL:			150

